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### B.—*Muscles of the Wing.*

| | TIERCEL.<br>Oz. | FALCON.<br>Oz. | CARA.<br>Oz. | CRANE.<br>Oz. |
|---|---|---|---|---|
| 1. *Serratus magnus*, | 0·04 | 0·06 | 0·05 | — |
| 2. *Rhomboideus*, | 0·02 | 0·03 | 0·07 | — |
| 3. *Teres major*,[m] | 0·02 | 0·02 | 0·02 | — |
| 4. *Latissimus dorsi*, | 0·03 | 0·03 | 0·04 | — |
| 5. *Subscapularis*, | 0·04 | 0·04 | 0·04 | — |
| 6. *Pectoralis minor*, | 0·05 | 0·05 | 0·04 | 0·06 |
| 7. *Pectoralis major*,[n] | 0·73 | 0·76 | 1·03 | 2·00 |
| 8. *Pectoralis secundus avium*, | 0·08 | 0·11 | 0·10 | 0·37 |
| 9. Wingfolder (*extensor plicæ alaris*),[o] | 0·03 | 0·04 | 0·04 | — |
| 10. *Coracobrachialis*, | 0·03 | 0·03 | 0·02 | — |
| 11. *Deltoideus internus* (*clavicularis*),[p] | 0·03 | 0·02 | 0·02 | — |
| 12. *Deltoideus externus* (*scapularis*),[q] | 0·09 | 0·08 | 0·12 | — |
| 13. *Supra et infra spinatus*,[r] | 0·09 | 0·07 | 0·10 | — |
| 14. *Biceps humeri*, | 0·05 | 0·04 | 0·06 | — |
| 15. *Triceps humeri*, | 0·11 | 0·14 | 0·15 | — |

The Rev. SAMUEL HAUGHTON, M. D., Fellow of Trinity College, Dublin, read the following paper:—

## NOTES ON ANIMAL MECHANICS.

## XVIII.—ON THE COMPARATIVE MYOLOGY OF CERTAIN RUMINANTS.

IN the following comparisons of the muscles of Ruminants I have made the Indian Goat the standard; the other animals examined being the Virginian Deer, the Nylghau, and Napu Deer of Java.

### A.—*Muscles of the Hind Limb.*

| | GOAT.<br>Oz. | DEER.<br>Oz. | NAPU.<br>Oz. |
|---|---|---|---|
| 1. *Sartorius*,[a] | 0·11 | 1·25 | 0·13 |
| 2. *Tensor vag. femoris*, | 0·42 | 4·25 | |
| 3. *Psoas magnus*, | 0·97 | 7·50 | 0·37 |
| 4. *Iliacus*, | 0·26 | 2·50 | 0·05 |
| [*Psoas parvus*], | 0·15 | 1·75 | 0·04 |
| 5. *Pectinæus*, | — | 2·25 | 0·03 |

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[m] The *teres major* arises from the spinous processes of the lower dorsal vertebræ, and crosses the lower extremity of the scapula, to be inserted by a flat tendon into its usual place in the humerus.

[n] A slip from the upper edge of this muscle joins the wingfolder (*extensor plicæ alaris* Carus).

[o] This muscle takes its origin from the acromion, and is inserted into the wrist, acting directly as a folder of the wing.

[p] Arises from the tip of the acromion, and is inserted into the top of the humerus, inside the pectoral ridge.

[q] Origin, from the portion of the scapula adjoining the acromion; insertion into the outer side of the pectoral ridge of the humerus; rotates the arm powerfully outwards.

[r] Arise from the lower two-thirds of the outer side of the scapula.

[a] The *sartorius* in the Goat has a double origin—

*a*. From the anterior edge of the pubis, close to the acetabulum.
*b*. From the anterior superior crest of the ilium, by fascia.

| | GOAT.<br>Oz. | DEER.<br>Oz. | NAPU.<br>Oz. |
|---|---|---|---|
| 6. *Adductor brevis*, | 0·41 | — | 0·05 |
| 7. *Adductor longus*, | 1·28 | — | — |
| 8. *Adductor magnus*,<br>9. *Semimembranosus*, [b] | 1·19 | 23·50 | 0·66 |
| 10. *Semitendinosus*, | 0·43 | 9·25 | 0·13 |
| 11. *Obturator externus*, | 0·48 | — | — |
| 12. *Quadratus femoris*, | 0·12 | — | 0·03 |
| 13. *Obturator internus*, &c.,[c] | 0·17 | — | — |
| 14. *Glutæus maximus*,<br>15. *Biceps femoris*, [d] | 1·86 | 36·50 | 0·59 |
| 16. *Glutæus medius*, | 1·11 | 10·00 | 0·19 |
| 17. *Glutæus minimus*,[e] | 0·50 | 1·75 | 0·06 |
| 18. *Glutæus quartus* (*iliocap.*),[e] | 0·29 | 1·00 | 0·04 |
| 19. *Gracilis*,[f] | 0·40 | 4·50 | 0·08 |
| 20. *Rectus femoris*, | 1·15 | 10·50 | — |
| 21. *Vastus externus* (a), | 0·85 | 11·75 | — |
| 22. *Vastus externus* (b), | 0·28 | — | — |
| 23. *Vastus internus* (a), | 0·36 | 4·25 | — |
| 24. *Vastus internus* (b), | 0·29 | — | — |
| 25. *Cruræus*, &c., | — | 2·75 | — |

### *Leg of Goat.*

| | Oz. | | Oz. |
|---|---|---|---|
| 26. *Gastrocnemido-solæus*, | 0·92 | 31. *Tibialis anticus*,[i] | 0·22 |
| 27. *Plantaris*,[g] | 0·06 | 32. *Extensor digitorum communis*,[i] | 0·09 |
| 28. *Poplitæus*, | 0·15 | 33. *Peronæus longus*, | 0·04 |
| 29. *Flexor digitorum longus*, | 0·25 | 34. *Peronæus brevis*, | 0·08 |
| 30. *Flexor hallucis longus*,[h] | 0·04 | | |

## B.—*Muscles of the Fore Limb in the Goat.*

| | Oz. Av. |
|---|---|
| 1. *Trapezius scapularis*, | 0·35 |

Origin; from the cervical vertebræ (4 – 7); and from the dorsal (1 – 4).

Insertion; into the spine of the scapula; separable with difficulty from the next.

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[b] These muscles are combined in their muscular portion into one fleshy mass in the Goat, Deer, Nylghau, and little Napu; but retain their characteristic insertions into the whole length of the back of the femur, and into the top of the tibia and fascia of knee joint.

[c] The anterior border of the *gemelli* joins the posterior border of the *iliocapsularis.*

[d] The *gl. max.* and *biceps fem.* form one muscle, having the double origin. In the Goat the insertion is into the fascia of the thigh below the trochanter, and one-third down the outer side of the leg; in the Deer and Nylghau the portion with glutæal origin has bicipital insertion, and the portion with bicipital origin is inserted into the fascia of the inner side of the knee; in the Napu the origin of these muscles is covered by the sacral fascia, which, with the lumbar, is converted partially into a bony covering; the insertion is into the fascia of the knee joint, and down the whole outer side of the leg as far as the os calcis.

[e] The *gl. min.* and *gl. quartus* form one muscle in the Nylghau.

[f] Inserted with the *semitendinosus* into the upper third of the leg.

[g] The *plantaris* is represented by a muscular slip from the back of the top of fibula.

[h] This little muscle takes its origin from the tibia, just below the *poplitæus*, and is inserted at half an inch below the heel into the tendon of the common flexor.

[i] The *tibialis anticus* arises from the anterior curved surface of the tibia, and by a round tendon, common to it with the *extensor digitorum longus*, from the anterior surface of the outer condyle, inside the knee joint.

Oz. Av.

2. *Trapezius* (*clavicularis*), (*Humeromastoideus*), . . . . 0·77

Origin; from the mastoid process and fascia covering the second vertebra.

Insertion; into the fascia of No. 1, covering the anterior portion of the spine of the scapula, passing downwards (as external deltoid) into the fascia covering the *biceps*, and finally inserted by common tendon with biceps into the forearm.

3. *Rhomboideus*, . . . . . . . . . . . . . . . . . 0·31

Including an accessory slip from the fourth cervical.

4. *Serratus magnus*, . . . . . . . . . . . . . . . 2·73

5. *Teres major*, . . . . . . . . . . . . . . . . . 0·23

6. *Latissimus dorsi*, . . . . . . . . . . . . . . . 0·43

There is also a *latissimus dorsi superficialis*, part of the *panniculus carnosus*, which extends from the border of the true *lat. dorsi et pectoralis major*, partly covering both these muscles, and is inserted into the fascia of the back of the humerus, both on the inner and on the outer side, and into the elbow joint.

7. *Subscapularis*, . . . . . . . . . . . . . . . . 0·59

8. *Pectoralis minor*, . . . . . . . . . . . . . . . 0·82

9. *Pectoralis major*, . . . . . . . . . . . . . . . 0·51

Inserted into the fascia binding down the *biceps*, and into the near end of the ulna.

10. *Coracobrachialis*, . . . . . . . . . . . . . . 0·07

11. *Deltoideus externus*, . . . . . . . . . . . . . 0·13

Lies under the *humeromastoid.*

12. *Supraspinatus*, . . . . . . . . . . . . . . . . 1·72

13. *Infraspinatus*, . . . . . . . . . . . . . . . . 1·34

14. *Teres minor*, . . . . . . . . . . . . . . . . . 0·09

Arises from the middle of the lower border of the scapula, and is inserted into the fascia covering the outer head of the *triceps.*

15. *Infraspinatus secundus*, . . . . . . . . . . . . 0·12

This muscle is analogous to the *glutæus quintus* of the hind limb, found in the Kangaroo.

Origin; from the anterior third of the lower border of the scapula.

Insertion; into the greater tuberosity of the humerus, below the tendon of the *infraspinatus*, to which it seems related, as the *iliocapsularis* (*gl. quartus*) is to the *gl. minimus.*

Oz. Av.

16. *Biceps humeri,* . . . . . . . . . . . . . . . . 0·32

Inserted partly into the front of the bone of the forearm, to which it gives a direct lift, and partly by a tendon winding in a groove round it, being inserted into its inner and under surface.

17. *Brachiæus* (*externus*), . . . . . . . . . . . . . 0·26

Its tendon crosses the tendon of *biceps*, and is inserted on the inner and under side of the bone of the forearm, below the insertion of the *biceps.*

18. *Triceps,* . . . . . . . . . . . . . . . . . . 1·98

Has a fourth head, from *latissimus dorsi.*

19. *Anconæus,* . . . . . . . . . . . . . . . . . 0·16

20. *Flexor carpi ulnaris,* . . . . . . . . . . . . . 0·11

Inserted into the near end of cannon bone by a common tendon with *extensor carpi ulnaris.*

21. *Flexor carpi radialis,* . . . . . . . . . . . . . 0·07

Origin; from the inner condyle.
Inserted into the near and inner end of the cannon bone by a tendon passing through a groove in the wrist, inside that of the *flexor profundus.*

22. *Flexor digitorum sublimis,* . . . . . . . . . . 0·22
23. *Flexor digitorum profundus,* . . . . . . . . . 0·48
24. *Supinator radii longus,* . . . . . . . . . . . . 0·32

Inserted into the back of near end of cannon bone.

25. *Extensor carpi radialis,* . . . . . . . . . . . . 0·05

Distributed to the back of ungual phalanx of the outer toe, and by fascia to the inner toe.

26. *Extensor digitorum communis,* . . . . . . . . . 0·09

Distributed equally to both toes.

27. *Extensor carpi ulnaris,* . . . . . . . . . . . . 0·33

This important muscle, as in the Rhinoceros, actually flexes the wrist, though it represents the ulnar extensor; it is inserted by two tendons (of which one is common to the *flexor carpi ulnaris*) into the near end and inner side of the cannon bone. It takes its origin by a round tendon from the front of the outer condyle, inside the elbow joint, like the *tibialis anticus* and *extensor digitorum pedis.*

28. *Extensor ossis metacarpi pollicis,* . . . . . . . . 0·03

Arises from the ulna and interosseous membrane; and is inserted principally into the back of the phalanx of the inner toe.

The following donations were then presented:—

A collection of sixteen Original Views of the principal Buildings in Dublin, by the late George Petrie, LL. D.: presented by the Marquis of Kildare.

A perfect and beautifully formed Celt, of micaceous grit, found in a bog near Hacketstown, county of Carlow: presented by the Hon. and Ven. Archdeacon Stopford.

The Secretary read a letter from C. Darwin, Esq., returning thanks for his election as Honorary Member of the Academy.

## MONDAY, MAY 14, 1866.

SIR WILLIAM R. W. WILDE, M. D., Vice-President, in the Chair.

John Barrington, Esq., D. L.; John Casey, Esq.; and William Frazer, Esq., were elected Members of the Royal Irish Academy.

The Rev. J. H. JELLETT read a paper

### ON A FLUID POSSESSING OPPOSITE ROTATORY POWERS FOR RAYS AT OPPOSITE ENDS OF THE SPECTRUM.

HE commenced by alluding to the construction of an instrument which he had exhibited and described to the Academy some time ago.* The purpose of this instrument is to measure the rotatory power of a transparent fluid, not directly, but by the method of *compensation*. For this purpose the ray of polarized light, before† its passage through the fluid under examination, is transmitted through a fluid of an opposite rotatory power; and the construction of the instrument provides a method of varying and measuring with exactness the length of the column of this latter fluid through which the ray passes. The fluids used for this purpose were, in general, the two well-known species of oil of turpentine—namely, that which is obtained from the *Pinus maritima* of the South of France, and that which is obtained from the *Pinus Australis* of North Carolina. The former of these, being a left-handed substance, is used in the examination of fluids which, like the solution of cane sugar, are right-handed; and the latter, being right-handed, for those substances which, like the solution of quinine, and the great majority of fluids possessing the rotatory power,‡ are left-handed.

A means is thus obtained of comparing the rotatory powers of all fluids for which the rotation is in the same direction; but, in order to compare those whose rotatory powers are opposite, it became necessary, in the first place, to ascertain the relative rotatory powers of the

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* "Proceedings," vol. viii., p. 279.

† The order of transmission is indifferent, but the construction of the instrument requires that the light should pass *first* through the compensating fluid.

‡ So far at least as the author has examined them.